

Spillover effects of government subsidies on outward foreign direct investment: Evidence from China

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Abstract

We examine the effect of government subsidies on outward foreign direct investment (OFDI) by Chinese listed firms. Based on a panel dataset covering Chinese listed firms from 2009 to 2021, our findings indicate that government subsidies can promote OFDI by enhancing the production efficiency, innovation capability, and social performance of Chinese listed firms. Furthermore, the heterogeneous analyses show that non-tax-based subsidies significantly promote OFDI by Chinese listed firms, and government subsidies do not result in a discernible preference for greenfield investments or mergers and acquisitions. In addition, government subsidies can significantly contribute to promoting OFDI for non-SOEs, older firms, firms in globally emerging sectors and domestically catching-up sectors, as well as firms located in eastern China.

KEYWORDS

Chinese listed firms, digitalization, ESG, government subsidies, OFDI, total factor productivity

JEL CLASSIFICATION

F21, H71, O25

1 | INTRODUCTION

Subsidies are commonly used by national governments to implement industrial policies in both high-income and emerging economies (Dawar & Ronen, 2022; Hoekman et al., 2020; Horlick & Clarke, 2017). However, the debate on the effects of government subsidies has been ongoing and

has not reached a conclusive judgment. On the one hand, government subsidies are considered beneficial for economic growth and industrial development. Governments justify subsidies as a means to address market imperfections characterized by high entry barriers and sunk costs for domestic firms (Liu, 2019; Schwartz & Clements, 1999). On the other hand, certain studies suggest that government subsidies can lead to opportunism, corruption, and inefficiency, thereby failing to enhance firm performance (Brander et al., 2010; Klette & Møen, 1998). Alternatively, subsidies may have mixed effects, simultaneously stimulating growth in output, employment and fixed assets, while impeding firm productivity (Bernini & Pellegrini, 2011). Given the conflicting assessments of government subsidies, there is a clear need for more extensive empirical studies. More importantly, policy discussions are intensifying over the spillovers that domestic subsidies may create at the international level. Despite the widespread utilization of domestic subsidies, little attention has been given to their cross-border spillovers (Blonigen, 2016; Kalouptsi, 2018), necessitating further assessment of the nature and magnitude of these spillovers.

Outward foreign direct investment (OFDI) by emerging markets has become increasingly noteworthy and prevalent in recent years. While firm-level factors are crucial in shaping OFDI (Ai & Tan, 2017; Björkman et al., 2007; Deng, 2010), the behavior and policies of governments in emerging markets also significantly impact the strategic decisions of firms (Becker-Ritterspach et al., 2019; Luo et al., 2010). In this regard, the economic development of China and the role of its government have attracted considerable attention, given the country's emergence as a significant driver of OFDI.

Although there is a large body of literature on government subsidies and OFDI as separate topics, there are few studies that have established a clear connection between these two topics (Becker-Ritterspach et al., 2019; Chen & Huang, 2007; Luo et al., 2010). Consequently, there is a need to expand the micro-econometric study on the effect of government subsidies on OFDI, with particular attention to emerging markets.

Therefore, this article aims to empirically examine the effect of Chinese government subsidies on OFDI by Chinese listed firms. We collect a large sample of data from Chinese listed firms spanning the period from 2009 to 2021, and conduct research in the following aspects: First, we develop a fixed-effects regression model to investigate the effect of government subsidies on the OFDI by Chinese listed firms. Subsequently, we conduct several robustness checks, including sample reconstruction, alternative independent variables, application of GMM regressions and inclusion of joint fixed effects. Moreover, we address potential endogeneity issues by employing instrumental variables in 2SLS regressions. Our results show that government subsidies can generally promote OFDI by listed firms. Second, we analyze the mechanisms by which government subsidies contribute to the growth of China's OFDI. We adopt a performance-based approach to ascertain three indicators of firm performance (production efficiency, innovation capability, and social performance) as mediators in the correlation of government subsidies and OFDI by Chinese listed firms. Third, we perform group regressions, considering the heterogeneity of subsidies, OFDI and firm characteristics. Our findings indicate that the effect of government subsidies on OFDI varies depending on the types of subsidies and firm characteristics. Compared with tax-based subsidies, non-tax-based subsidies play a more significant role in promoting OFDI. Moreover, government subsidies have a more pronounced promoting effect on OFDI by non-SOEs, older firms, firms in globally emerging sectors and domestically catching-up sectors, as well as firms located in eastern China.

Our research makes three contributions to the existing literature. First, although international policy discussions extensively focus on the cross-border spillovers of national government subsidies (Hoekman & Nelson, 2020), it is important to acknowledge that such policy interventions

can result in both positive and negative cross-border spillovers (Blanchard, 2015; Van Biesebroeck, 2010), yet there is a lack of evidence-based empirical studies. This article aims to address this research gap by investigating the investment spillovers of government subsidies at the firm level, and empirically validating the positive association between government subsidies and OFDI by Chinese listed firms. Second, although there is relevant research on the effects of home government policies on firms' OFDI (Becker-Ritterspach et al., 2019; Luo et al., 2010), the majority of studies concentrate on a range of government policies as a whole, rather than specifically examining government subsidies. In addition, there is a lack of comprehensive examination of the underlying mechanisms responsible for the effects of government subsidies on OFDI. Our research establishes a direct connection between government subsidies and firm's OFDI, and enhances the understanding of how government subsidies can positively contribute to the OFDI growth through improved production efficiency, innovation capability, and social performance of firms. Third, previous studies indicate the presence of heterogeneity among firms within any given economy (Kirchner, 2016). In this context, we consider the diversity of firm characteristics including ownership, age, sector, and geographical location, to investigate the variations in the effect of government subsidies.

The remainder of the article is organized as follows: Section 2 provides the literature review. Section 3 describes the background of Chinese government subsidies and OFDI. Section 4 presents the model, variables and data. Section 5 provides the baseline estimation results. Section 6 conducts mechanism analyses. Section 7 provides heterogeneity analyses. Section 8 concludes.

2 | LITERATURE REVIEW

The literature on the effect of government subsidies on firms has not reached a conclusive judgment. Some studies suggest that government subsidies can enhance productivity (Aghion et al., 2015; Cin et al., 2017), promote R&D activities and innovation (Chen & Zhu, 2008; Guo et al., 2016; Mateut, 2018), and generate higher social returns (Irwin & Klenow, 1996). Other studies indicate that government subsidies could impede the operational performance of firms by encouraging rent-seeking behavior, short-sighted and irrational investment decisions, and fostering financial dependence and organizational inertia (Wang et al., 2014; Yu et al., 2010). Additionally, Yi et al. (2021) investigate the effects of government subsidies and the globalization thereof on the short and long term financial outcomes of the Chinese firms, and argue that the globalization of the Chinese firms have significant negative effects on their short term profitability irrespective of whether the firms received government subsidies.

However, there is limited research on the cross-border spillover effects arising from subsidies, despite their greater complexity in the current highly interconnected global value chain world compared to a scenario where production and supply chains remain domestic (Hoekman, 2015; Hoekman & Nelson, 2020). OFDI and the global value chain are closely intertwined, allowing firms to engage in the global value chain by means of OFDI, such as mergers and acquisitions (M&A) or greenfield investments. Therefore, OFDI represents a notable form of spillover effects.

In understanding the factors that influence firms' OFDI, scholars emphasize the significance of firm-level factors. Notably, previous research shed light on the impact of various factors such as firm productivity (Wakasugi & Zhang, 2012; Wei et al., 2014), competitive advantage of the parent company (Ge & Luo, 2013), social responsibility advantages (Xie & Lu, 2022), export orientation (Gao et al., 2011), ownership strategies (Ilhan-Nas et al., 2018), and ownership concentration

(Yi et al., 2022) on firms' strategic decisions related to internationalization. In parallel, government policies also influence firms' OFDI (Bannò & Sgobbi, 2010; Goh, 2011; Guo & Clougherty, 2015; Nayyar & Mukherjee, 2020). Government policies can aid firms in addressing market imperfections domestically and countering competitive disadvantages in the global market (Aggarwal & Agmon, 1990; Buckley, Buckley, et al., 2010). This, in turn, may encourage firms to expand their operations into the global market (Becker-Ritterspach et al., 2019; Luo et al., 2010). Previous research indicates that governments play a significant role in influencing firms' OFDI by establishing institutional frameworks (Sauvant & Chen, 2014; Witt & Lewin, 2007), and exercising control over state ownership (Cui & Jiang, 2012; Huang & Renyong, 2014).

Although there is a rich body of research exploring the factors that influence firms' OFDI, few studies have directly investigated the relationship between subsidies and OFDI. Bannò et al. (2014) find that public fiscal support has a substantial positive impact on OFDI by small and medium-sized enterprises. It is noteworthy that this impact is particularly pronounced for firms with smaller scales, shorter age, and prior experience in overseas expansion. Tang (2021) presents a hypothesis of an inverted U-shaped relationship between market-supporting institutions in the host country and the scale of OFDI by emerging market firms in that particular host country. Furthermore, the author argues that government subsidies provided in the home country can reinforce this inverted U-shaped relationship. Additionally, Gallagher and Irwin (2014) focus on the role of Chinese state finance in OFDI, and compare their findings to the situations in Japan, Korea and other Asian countries. By exploring reasons for China's comparatively high ratio of OFDI lending, the authors shed light on the unique characteristics of Chinese state finance and the potential implications for China's OFDI activities.

In summary, extensive research has been conducted on the importance of government subsidies in achieving policy objectives and the factors that influence firms' OFDI. However, few research explores the specific effects of subsidies on OFDI. Additionally, there is a lack of comprehensive analyses regarding the underlying mechanisms that drive the effects of subsidies on the firms' OFDI, along with the observed heterogeneity in these effects.

3 | BACKGROUND

The government plays a significant role in the Chinese economy (Băzăvan, 2019; Liou, 1998), utilizing subsidies as a crucial tool to achieve policy objectives (Lo, 2014; Zhu & Tan, 2022). Since 2012, there has been a notable increase in the government subsidies received by Chinese listed firms.¹ In 2021 alone, the government subsidies received by listed firms exceeded 170 billion RMB in total. The number of listed firms benefiting from government subsidies has also expanded substantially over time. In 2009, only 123 listed firms received government subsidies, whereas by 2021, this number had risen to 1704. These trends indicate a shift in Chinese government support from "targeted subsidies" to a more "horizontal subsidies" approach (see Figure 1).

Moreover, subsidies in China exhibit heterogeneity based on regional, ownership, and industry-specific characteristics. First, listed firms in the eastern region receive a significantly higher total amount of subsidies compared to firms in non-eastern regions (see Figure A1). Furthermore, the level of government subsidies² in the eastern region has been consistently higher than in non-eastern regions since 2013, with some fluctuations observed in both regions (see Figure A2). Second, the presence of a large number of state-owned enterprises (SOEs³) is a distinctive feature of China and has attracted attention from various stakeholders. Initially, SOEs received a larger amount of government subsidies compared to non-SOEs; however, the gap

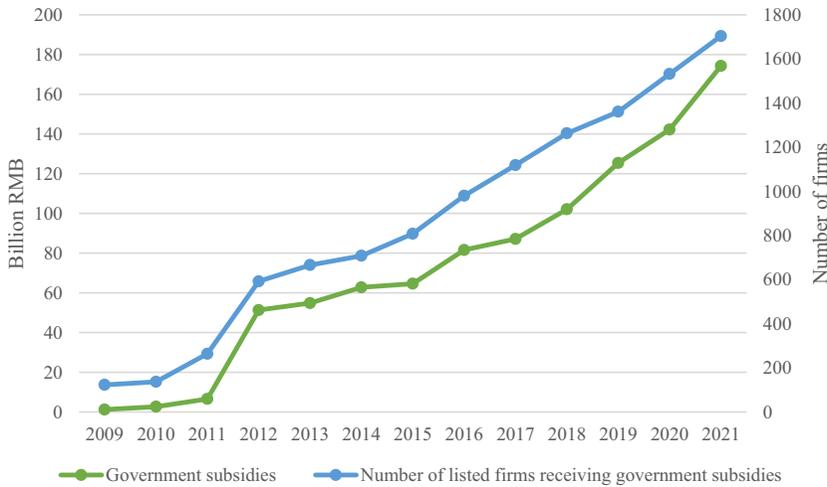


FIGURE 1 Amount of government subsidies and number of listed firms receiving subsidies. [Colour figure can be viewed at wileyonlinelibrary.com]

between the two has progressively narrowed (see Figure A3). Notably, since 2016, non-SOEs have received a higher level of government subsidies than SOEs indicating the absence of “ownership discrimination” in the allocation of Chinese government subsidies (see Figure A4). Third, China has its own strategic priorities in terms of industrial development. Since the launch of the “Made in China 2025” initiative in 2015,⁴ the subsidies directed towards strategic sectors⁵ targeted by the initiative have experienced an upward trend (see Figure A5). Fourth, based on the relative development stage of different industries compared to the global frontier, three types of sectors have been identified (Mao et al., 2021).⁶ The domestically mature sectors have received relatively few government subsidies. In contrast, the globally emerging sectors and the domestically catching-up sectors have been prioritized by Chinese government subsidies (see Figure A6).

At the same time, as China continues to integrate rapidly with the global economy, its OFDI has seen significant growth in recent years (Kamal et al., 2020; Ren & Yang, 2020). Chinese listed firms have witnessed substantial growth, with their OFDI increasing from 6.2 billion RMB in 2009 to 721 billion RMB in 2021. Besides considering the scale of OFDI, we have also calculated the number of listed firms engaging in OFDI activities each year. In 2021, a total of 1860 listed firms were engaged in OFDI activities, which is 13 times the number of listed firms involved in OFDI in 2009 (see Figure 2).

Furthermore, the heterogeneity of firms’ OFDI reflects various aspects of China’s integration into the global economy. First, Chinese OFDI extends to a wide range of host countries. As of the end of 2021, Chinese listed firms have expanded their OFDI to 104 countries and regions worldwide (see Figure A7). Second, driven by their individual development needs, Chinese listed firms exhibit diverse choices when it comes to OFDI entry modes. The greenfield investment by listed firms has experienced significant growth from 2009 to 2021, while mergers and acquisitions (M&A) have remained relatively stable (see Figure A8). Third, the industry in which a Chinese listed firm operates also influences its OFDI decisions. Firms engaging in OFDI are mainly concentrated in the manufacturing and mining sectors, with manufacturing accounting for 53% of the total OFDI and mining accounting for 15% of the total OFDI. Other sectors, including construction, transportation, gas, electricity and water, information and computer, collectively account for 20% of the total OFDI. In contrast, OFDI in the remaining sectors is fragmented (see Figure A9).

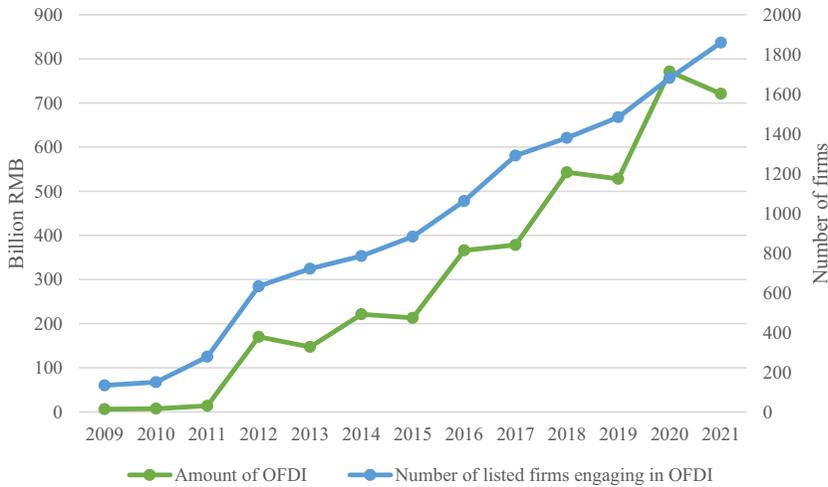


FIGURE 2 Amount of OFDI and number of listed firms engaging in OFDI. [Colour figure can be viewed at wileyonlinelibrary.com]

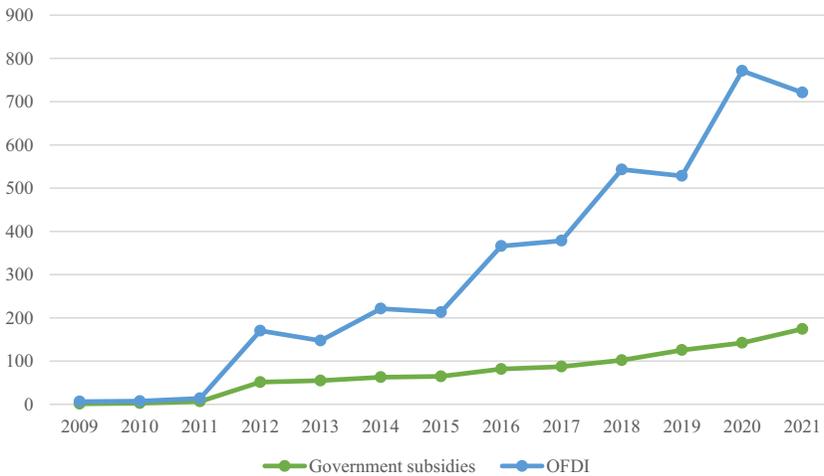


FIGURE 3 Amount of government subsidies and OFDI by listed firms (billion RMB). [Colour figure can be viewed at wileyonlinelibrary.com]

The comparative trend of subsidies and OFDI in China provides a visual representation of their correlation, which lays the foundation for empirical research in subsequent sections. We observe an upward trend for both subsidies and OFDI during the period of 2012–2021 (see Figure 3). However, to establish a causal relationship between the two, detailed empirical analysis is required.

4 | EMPIRICAL STRATEGY

4.1 | Model design and variable description

We will start with examining the direct effect of government subsidies on the OFDI undertaken by Chinese listed firms. To analyze this relationship, we set up Equation (1) as follows:

$$\text{OFDI}_{ijt} = \beta_0 + \beta_1 \text{Subsidy}_{it} + \beta_2 \text{Controls}_{it} + \lambda_i + \lambda_j + \lambda_t + \varepsilon_{ijt} \quad (1)$$

In Equation (1), i represents the sample firm, j represents the host country, and t corresponds to the specific year. Following the methodology utilized in previous studies (Buckley et al., 2015; Nguyen et al., 2018), OFDI_{ijt} represents the annual amount of OFDI undertaken by firm i in country j at time t . Subsidy_{it} represents the annual amount of government subsidies granted to firm i at time t (Boeing, 2016).

In addition, we include control variables that reflect firm-specific characteristics. The control variables are as follows:

1. Firm solvency (Size and Leverage): Given the significance of firm size in influencing firms' decisions regarding overseas production (Pan & Li, 2000), we incorporate the Size variable, which represents the total operating revenue of the firm. Additionally, we measure the potential slack assets of a firm using Leverage, which represents the total debt-to-total assets ratio of the firm (Yiu et al., 2007).
2. Firm profitability (Cash and Overseas): As OFDI is often financed through internal funds or debt, we control for the size of internal accruals by incorporating Cash, which represents the proportion of net cash flow from operating activities of the firm (Bhaumik & Driffield, 2011). Moreover, considering the positive relationship between international experience and engagement in OFDI activities (Delios & Henisz, 2000), we include Overseas as a variable representing the proportion of the firm's revenue generated from overseas operations (Delios & Beamish, 1999).
3. Firm governance structure (Dual, State, Independence, and Management): The management structure of firms plays a crucial role in their global expansion (Fung et al., 2020; Guo et al., 2022). Therefore, we incorporate Dual as a variable indicating whether the CEO and chairman of the board is the same person in the firm. Additionally, as previous studies suggest that SOEs may receive different institutional treatments both domestically and internationally (Globerman & Shapiro, 2009; Luo et al., 2010), we include State to represent the proportion of state-owned shares in the firm. Furthermore, we control for the impact of independent directors by including Independence as a variable measuring board independence (Lu et al., 2009). Finally, considering the importance of equity ownership in managerial power and the ability to implement strategic changes (Filatotchev et al., 1999), we include Management as a variable representing management shareholding in the firm. Besides, λ_i , λ_j , and λ_t are fixed effects of firm, host country and year, respectively. ε_{ijt} is random disturbance term. The variable measurements are shown in Table 1.

4.2 | Data and sample construction

In this article, we collected data from the China Stock Market and Accounting Research (CSMAR) Database. Our dataset is composed of non-financial firms that are publicly listed and traded on either the Shanghai or the Shenzhen Stock Exchanges. We specifically chose listed firms as our sample due to the comprehensive and reliable information disclosure regarding government subsidies among listed firms. To ensure the sample is not influenced by events related to the global financial crisis in 2008, we selected 2009 as the starting point for our sample period. We excluded observations from the sample if they had missing values or if the firms exhibited abnormal operating conditions.

TABLE 1 Variable measurements.

Variables	Notation	Definition
Dependent variable	OFDI	Natural logarithm of (1 + OFDI)
Independent variable	Subsidy	Natural logarithm of (1 + subsidy value)
Control variables	Size	Natural logarithm of (1 + total operating revenue)
	Leverage	Ratio of total debt to total asset
	Cash	Ratio of net cash flow from operating activities to total asset
	Overseas	Ratio of overseas operating revenue to total operating revenue
	Dual	A dummy, =1 if the same person serves as CEO and the chairman of the board, =0 if Otherwise
	State	Proportion of state-owned shares
	Independence	Proportion of independent directors over total board members
Management	Proportion of management shareholding over total shareholding	

Additionally, we further excluded host countries classified as “tax havens”⁷ in our sample. Chinese investments in tax havens have been identified as a potential distortion factor when analyzing investment motives. Investments in tax havens often involve the practice of “round-tripping,” whereby funds are moved abroad to take advantage of beneficial tax incentives and then re-invested domestically (Tseng & Zebregs, 2002; Yeung & Liu, 2008). These flows might also represent the establishment of holding companies for investment in other locations, or attempts to conceal wealth from tax authorities or other parties (Clegg & Voss, 2011; Morck et al., 2008; Sutherland & Ning, 2011). Due to the difficulty to discern the nature and ultimate destinations of FDI flows via tax havens (Morck et al., 2008), it is common practice to exclude these FDI flows from the sample analysis to ensure data reliability (Hurst, 2011; Kolstad & Wiig, 2009). Furthermore, we performed winsorization on continuous variables by adjusting extreme values to the 1st and 99th percentiles to minimize the impact of outliers.

After these steps, our final dataset consists of an unbalanced panel with 17,934 observations from 2027 firms, covering the period from 2009 to 2021. For detailed information, please refer to Table B1.

5 | BASELINE RESULTS

5.1 | Baseline regressions

Table 2 reports the results of baseline regressions. In column (1), the coefficient of the Subsidy variable demonstrates a statistically significant positive relationship. This finding remains consistent across columns (2)–(4) as we include control variables successively. Regarding the control variables, we observe that the coefficients of the Size variable are significantly positive. This suggests that larger firms exhibit a greater inclination to engage in overseas

TABLE 2 Baseline regressions.

Variables	(1) OFDI	(2) OFDI	(3) OFDI	(4) OFDI
Subsidy	0.0959*** (0.0217)	0.0846*** (0.0220)	0.0835*** (0.0220)	0.0825*** (0.0220)
Size		0.0437** (0.0188)	0.0433** (0.0188)	0.0421** (0.0188)
Leverage		0.4683** (0.1995)	0.4482** (0.1997)	0.4407** (0.1987)
Cash			-0.1990 (0.3025)	-0.1814 (0.3030)
Overseas			0.4505*** (0.1607)	0.4548*** (0.1605)
Dual				0.0036 (0.0578)
Independence				-0.2700 (0.5317)
State				0.2712 (0.2528)
Management				-0.2745 (0.2325)
Constant	14.3402*** (0.3714)	13.4055*** (0.5055)	13.3322*** (0.5066)	13.5144*** (0.5513)
Observations	17,723	17,723	17,723	17,723
R-squared	0.652	0.652	0.652	0.652
Firm FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

investments. Additionally, the coefficients of the Leverage variable are significantly positive. This implies that a relatively high leverage ratio may indicate either a greater risk appetite or the ability to borrow more easily due to stronger relationships with the lenders (Bhaumik & Driffield, 2011). Consequently, firms have access to sufficient funds for OFDI. Moreover, the coefficients of the Overseas variable are significantly positive. This indicates that firms with foreign experience possess a broader global vision and awareness. These firms have a comprehensive understanding of the foreign market environment, allowing them to objectively analyze the risks and benefits associated with a host country's market (Chen et al., 2020).

5.2 | Robustness tests

5.2.1 | Proxy variables

In addition to excluding samples related to tax havens, we further exclude Chinese OFDI to Taiwan, Macau, and Hong Kong regions (Li et al., 2020) to assess the robustness of the baseline regressions. In column (1) of Table 3, the coefficient of the Subsidy variable is significantly positive, confirming the positive effect of government subsidies on OFDI.

In addition, we use different proxy variables to measure government subsidies. The Subsidy2 variable is calculated as the ratio of government subsidies to firm's total assets (Deng et al., 2021), while the Subsidy3 variable is calculated as the ratio of government subsidies to firm's operating revenue. These two proxy variables account for the firm's size. The results in columns (2) and (3) of Table 3 align with those obtained from baseline regressions.

5.2.2 | GMM regression

Moreover, the system GMM model incorporates the one-period lagged dependent variable as a proxy variable for certain omitted variables. Besides, the system GMM model selects exogenous instrumental variables from the historical changes of regression variables. To ensure overall exogeneity of instrumental variables, the Hansen test is employed. Our GMM model passes both the Arellano-Bond test and the Hansen test. In column (4) of Table 3, the coefficient of the one-period lagged dependent variable L.OFDI is significantly positive, indicating the continuity of OFDI over time. Furthermore, the coefficient of the Subsidy variable is significantly positive, which is consistent with the findings from baseline regressions.

As government subsidies vary across regions, industries, and ownership types, we introduce province-year, industry-year, and ownership-year fixed effects into the baseline regression to test its robustness. The results in column (5) of Table 3 align with those obtained from baseline regressions.

5.3 | Endogenous processing

One concern in our study is the endogeneity of government subsidies in relation to the OFDI. On the one hand, government subsidies may facilitate OFDI by firms; while on the other hand, successful OFDI performance by firms may induce the government to provide increased support. To address this potential endogeneity issue, we utilize the instrumental variable approach. We construct two instrumental variables. The first instrument M.subsidy represents the firm-level average amount of subsidies within the industry⁸ and province where the firm operates (Clausen, 2009; Neicu, 2019; Xie et al., 2021). The average level of subsidies is determined by the subsidies received by each firm. Nonetheless, the average level of subsidies is less likely to have a direct impact on the specific firm-level OFDI. Therefore, we consider M.subsidy to be a valid instrumental variable. The second instrument N_Firm represents the logarithm of the number of listed firms located in the same province (Chen et al., 2008; Lee et al., 2017). We use it as a proxy for the budget constraints faced by local governments. The greater the number of listed firms in a province, the more difficult it is for each local listed firm

TABLE 3 Robustness analyses.

Variables	(1) OFDI	(2) OFDI	(3) OFDI	(4) OFDI	(5) OFDI
Subsidy	0.0495* (0.0272)			0.0677*** (0.0187)	0.0783*** (0.0239)
Subsidy2		0.0305** (0.0142)			
Subsidy3			0.4533* (0.2636)		
Subsidy4					
L.OFDI				0.7842*** (0.0574)	
Size	0.0570* (0.0310)	0.0508*** (0.0187)	0.0680*** (0.0241)	0.0049 (0.0104)	0.0261 (0.0202)
Leverage	0.1618 (0.2322)	0.5320*** (0.1988)	0.5108** (0.1986)	-0.1271 (0.0859)	0.3901* (0.2166)
Cash	-0.0058 (0.3903)	-0.2209 (0.3029)	-0.2062 (0.3031)	0.3152 (0.2021)	-0.1348 (0.3259)
Overseas	0.3626* (0.1863)	0.4713*** (0.1603)	0.4555*** (0.1604)	-0.0230 (0.0567)	0.4059** (0.1714)
Dual	-0.0094 (0.0728)	0.0036 (0.0578)	0.0023 (0.0578)	0.0555* (0.0311)	0.0564 (0.0633)
Independence	-0.0904 (0.6339)	-0.2982 (0.5313)	-0.2947 (0.5317)	-0.0780 (0.2614)	0.0029 (0.0056)
State	0.0846 (0.2852)	0.2914 (0.2529)	0.2804 (0.2528)	0.6744*** (0.2188)	0.2341 (0.2938)
Management	0.1443 (0.3387)	-0.2761 (0.2327)	-0.2868 (0.2329)	-0.0833 (0.0999)	-0.0014 (0.0026)
Constant	13.5730*** (0.7891)	14.6822*** (0.4541)	14.3506*** (0.5560)	2.4228*** (0.7184)	13.6996*** (0.6141)
AR (2)				0.403	
Hansen test				0.122	
Observations	9727	17,723	17,723	14,362	17,576
R-squared	0.646	0.652	0.652		0.666
Firm FE	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Province-Year FE					YES
Industry-Year FE					YES
Ownership-Year FE					YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

TABLE 4 Instrumental variable tests.

Variables	(1) OFDI	(2) OFDI
Subsidy	0.1093** (0.0489)	0.6450** (0.2580)
Size	0.0350 (0.0216)	0.0033 (0.0326)
Leverage	0.3550 (0.2285)	-0.0100 (0.3344)
Cash	-0.1764 (0.3270)	0.2512 (0.2628)
Overseas	0.4652** (0.1822)	0.5548*** (0.1222)
Dual	0.0144 (0.0626)	0.0337 (0.0343)
Independence	-0.2932 (0.5778)	0.4978 (0.4193)
State	0.2033 (0.2760)	0.2016 (0.2110)
Management	-0.2275 (0.2471)	-0.1314 (0.2162)
Kleibergen-Paap rk LM	877.367 (0.0000)	6.025 (0.0141)
Cragg-Donald Wald F	5362.949	41.473
Kleibergen-Paap rk Wald F	1775.434	12.781
Observations	17,723	15,258
Firm FE	YES	YES
Country FE	YES	YES
Year FE	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

to acquire subsidies. Nonetheless, the variable N_Firm is unlikely to directly affect a specific firm's OFDI.

To assess the reliability of the two instrumental variables, Table 4 shows the results of instrumental variable tests. The Kleibergen-Paap rk LM statistics reject the under-identification hypothesis, while the Cragg-Donald Wald F statistics and Kleibergen-Paap rk Wald F statistics reject the weak identification hypothesis. These findings indicate the validity and reliability of the two instrumental variables. Even when considering the endogeneity issue, the coefficients of Subsidy variable remain significantly positive.

5.4 | Short-term sustained effect

We conducted further analysis to explore the duration of the positive effect of government subsidies on OFDI. Table 5 presents the results. In columns (1) to (3), the coefficient of the Subsidy variable is significantly positive. However, in column (4), this coefficient is not statistically significant, indicating that government subsidies may only have a short-term effect on OFDI. Upon receiving government subsidies, firms can obtain certain benefits, such as alleviating financial constraints. These benefits can partly promote OFDI activities. However, it is possible that these benefits diminish over time due to factors such as competing firms also acquiring government subsidies, or the recipient firms' inability to transfer government subsidies into competitive advantage.

TABLE 5 Short-term sustained effect of government subsidies.

Variables	(1) OFDI ($t + 1$)	(2) OFDI ($t + 2$)	(3) OFDI ($t + 3$)	(4) OFDI ($t + 4$)
Subsidy	0.0670*** (0.0221)	0.0635*** (0.0231)	0.0467* (0.0252)	0.0210 (0.0269)
Size	0.0375** (0.0182)	0.0042 (0.0211)	0.0351 (0.0288)	0.0000 (0.0271)
Leverage	0.3627* (0.2051)	0.1135 (0.2406)	-0.1808 (0.2765)	-0.4581 (0.3012)
Cash	-0.3988 (0.3273)	-0.2272 (0.3537)	-0.5107 (0.3840)	-0.5720 (0.4391)
Overseas	0.1190 (0.1621)	-0.0550 (0.1754)	-0.0782 (0.2018)	0.0322 (0.2189)
Dual	0.0004 (0.0663)	0.0561 (0.0700)	0.0819 (0.0740)	0.0568 (0.0814)
Independence	0.4167 (0.5722)	0.6986 (0.6090)	0.4598 (0.6860)	-0.0324 (0.7771)
State	0.3959 (0.2496)	0.3563 (0.2668)	0.2894 (0.3017)	0.1758 (0.3498)
Management	-0.0650 (0.2534)	0.1850 (0.2641)	0.3566 (0.2942)	0.3784 (0.3237)
Constant	13.9340*** (0.5469)	14.8282*** (0.6337)	14.7887*** (0.7586)	16.3936*** (0.7714)
Observations	14,138	11,111	8568	6381
R-squared	0.689	0.709	0.732	0.757
Firm FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

6 | MECHANISM ANALYSES

In this section, we further explore the mechanisms through which government subsidies affect OFDI by adopting a firm performance-based view. Our rationale is twofold. First, the ultimate effect of government subsidies on OFDI may vary across firms. OFDI exposes firms to high uncertainties such as liabilities of foreignness (Eden & Miller, 2004), thereby necessitating adequate resources and capabilities to undertake successful OFDI (Wang, Hong, Kafouros, & Wright, 2012). Therefore, the performance-based view asserts that firm-level resources and capabilities play a pivotal role in determining the scale of a firm's OFDI. Second, government support can enhance firm performance through multiple channels. Firms may encounter market imperfections that hinder their business activities and overseas operations. In this respect, government subsidies can serve as a policy tool to mitigate these market imperfections to some extent, consequently influencing the capabilities and performance of firms. In addition, the "late comer" hypothesis is applicable to firms in emerging economies like China. Such firms typically have limited international experience and competitive advantage (Yaprak et al., 2018). In response, government can implement a range of industrial policies, including subsidies, to help firms offset their competitive disadvantages and enable them to better compete against more experienced counterparts from advanced economies (Lu et al., 2011; Luo et al., 2010; Wang, Hong, Kafouros, & Boateng, 2012). In this section, we conduct mechanism analyses to explore how government subsidies affect financial constraints, production efficiency, innovation capacity, and social performance of firms, ultimately promoting their engagement in OFDI.

Based on Wen and Ye (2014), we construct the mediation effect model as follows:

$$\text{OFDI}_{ijt} = \beta_0 + \beta_1 \text{Subsidy}_{it} + \beta_2 \text{Controls}_{it} + \lambda_i + \lambda_j + \lambda_t + \varepsilon_{ijt} \quad (2)$$

$$\text{MV}_{ijt} = \theta_0 + \theta_1 \text{Subsidy}_{it} + \theta_k \text{Controls}_{it} + \lambda_i + \lambda_j + \lambda_t + \varepsilon_{ijt} \quad (3)$$

$$\text{OFDI}_{ijt} = \rho_0 + \rho_1 \text{Subsidy}_{it} + \varphi \text{MV}_{it} + \rho_k \text{Controls}_{it} + \lambda_i + \lambda_j + \lambda_t + \varepsilon_{ijt} \quad (4)$$

The coefficient β_1 in Equation (2) is the total effect of the independent variable Subsidy on the dependent variable OFDI. The MV_{it} in Equations (3) and (4) represents the intermediate variable. The coefficient θ_1 in Equation (3) is the effect of the independent variable Subsidy on the intermediate variable MV. The coefficient ρ_1 in Equation (4) is the direct effect of the independent variable Subsidy on the dependent variable OFDI after controlling the influence of the intermediate variable MV. The coefficient φ is the effect of the intermediate variable MV on the dependent variable OFDI after controlling the influence of the independent variable Subsidy. In the baseline regression, we have already tested the significance of the coefficient β_1 in Equation (2). If the coefficient θ_1 in Equation (3) is significant, we will continue run the Equation (4). If the coefficients ρ_1 and φ in Equation (4) are both significant, and the coefficient ρ_1 is smaller than the coefficient β_1 , there is a partial mediating effect of MV variable. If the coefficient ρ_1 is not significant and the coefficient φ is significant, there is a complete mediating effect of MV variable.

When examining the mediation effect model mentioned above, we take into account the potential endogeneity issue between the core independent variable and the intermediate variable. To address this concern, in the subsequent regressions of the mediation effect model, we employ the instrumental variable approach, using the two aforementioned instrumental variables related to government subsidies in 2SLS estimations. Our results maintain validity even after controlling for endogeneity, underscoring the robustness of our findings.

6.1 | Financial constraints of firms

We use the WW index (Whited & Wu, 2006) to measure the financial constraints of firms. The WW index is calculated as follows: TLTD is the ratio of long-term liabilities to total assets, DIVPOS is a dummy variable that takes a value of 1 when paying dividends, LNNTA is the natural logarithm of total assets, SG is the sales growth rate of the firm, ISG is the sales growth rate of the industry in which the firm is located, CF is the ratio of cash flow to total assets. The larger the value of WW index, the higher the degree of financial constraints of firms.

$$WW = 0.938 - 0.091CF - 0.062DIVPOS + 0.021TLTD - 0.044LNNTA + 0.102ISG - 0.0335SG \quad (5)$$

Table 6 presents the estimation results of the multi-step models, providing a partial mediating effect of firm's financial constraints on the positive correlation between government subsidies and OFDI.

Previous studies have highlighted how financial constraints hinder firms' OFDI (Buch et al., 2014; Yan et al., 2018; Ze & Sun, 2016), with financial incentives of government subsidies helping alleviate these financial constraints (Buckley, Clegg, et al., 2010; Li et al., 2021; Lu et al., 2011), thereby enhancing firms' risk-bearing abilities and operational efficacy in overseas markets (Liu et al., 2024). Government subsidies can not only function as a direct funding or substitutes for costly financing, but also bring along reputational benefits that signal government backing, potentially lowering financing costs (Lim et al., 2018) and attracting private investors (Guo, 2018; Takalo & Tanayama, 2010; Wang et al., 2017). Our findings have confirmed that government subsidies can ease firms' financial constraints and thus promoting their OFDI.

6.2 | Production efficiency of firms

To calculate the total factor productivity (TFP) of firms, we employ the LP method (Levinsohn & Petrin, 2003; Lu & Lian, 2012). Table 7 presents the estimation results of the multi-step mediation effect model, providing evidence of a partial mediation effect of firm's TFP in the positive correlation between government subsidies and OFDI.

Improving TFP is a crucial pathway for China to achieve higher quality, more efficient, and sustainable economic development. The 19th National Congress of the Communist Party of China explicitly outlined the need to "promote transformation of the quality, efficiency, and driving force of economic development, while raising total factor productivity."⁹ Previous research has suggested that firms with low productivity tend to focus primarily on their domestic market, while firms with high productivity possess the capacity and energy to engage in overseas investment activities (Helpman et al., 2004; Kimura & Kiyota, 2006; Melitz, 2003; Tomiura, 2007). Our findings have confirmed that governments subsidies can improve firms' TFP and thus facilitating their OFDI.

6.3 | Innovation capability of firms

We focus on the innovation performance of firms as a critical capability for OFDI, and examine the level of digitalization as an important aspect of innovation. In 2021, China's

TABLE 6 Mediation effect: easing financial constraints.

Variables	(1) OFDI	(2) WW	(3) OFDI
Subsidy	0.0825*** (0.0220)	-0.0081*** (0.0026)	0.0816*** (0.0220)
WW			-0.1105* (0.0564)
Size	0.0421** (0.0188)	-0.0157*** (0.0023)	0.0404** (0.0188)
Leverage	0.4407** (0.1987)	-0.3185*** (0.0254)	0.4055** (0.2006)
Cash	-0.1814 (0.3030)	0.0570 (0.0419)	-0.1751 (0.3031)
Oversea	0.4548*** (0.1605)	-0.0139 (0.0171)	0.4533*** (0.1605)
Dual	0.0036 (0.0578)	0.0210*** (0.0077)	0.0059 (0.0578)
Independence	-0.2700 (0.5317)	-0.1118* (0.0600)	-0.2824 (0.5317)
State	0.2712 (0.2528)	-0.1492*** (0.0307)	0.2548 (0.2529)
Management	-0.2745 (0.2325)	-0.1549*** (0.0329)	-0.2916 (0.2325)
Constant	13.5144*** (0.5513)	-0.2325*** (0.0671)	13.4887*** (0.5511)
Observations	17,723	17,723	17,723
R-squared	0.652	0.583	0.652
Firm FE	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

Ministry of Commerce released the “Guidelines for Foreign Investment Cooperation in Digital Economy,”¹⁰ which emphasizes China’s active participation in the digital economy and the development of globally competitive digital firms. To measure the digitalization level of firms, we employ text mining analysis to calculate the frequency of digital-related vocabulary in the annual reports of listed firms (Yuan et al., 2021). The methodology involves the following steps:

TABLE 7 Mediation effect: enhancing production efficiency.

Variables	(1) OFDI	(2) TFP	(3) OFDI
Subsidy	0.0825*** (0.0220)	0.1937*** (0.0197)	0.0765*** (0.0221)
TFP			0.0309*** (0.0090)
Size	0.0421** (0.0188)	0.2125*** (0.0161)	0.0355* (0.0188)
Leverage	0.4407** (0.1987)	2.0445*** (0.1952)	0.3775* (0.1990)
Cash	-0.1814 (0.3030)	-0.3378 (0.3201)	-0.1710 (0.3025)
Oversea	0.4548*** (0.1605)	0.2611* (0.1436)	0.4467*** (0.1599)
Dual	0.0036 (0.0578)	-0.2267*** (0.0535)	0.0106 (0.0578)
Independence	-0.2700 (0.5317)	1.0733*** (0.4139)	-0.3032 (0.5316)
State	0.2712 (0.2528)	-1.9286*** (0.3270)	0.3309 (0.2521)
Management	-0.2745 (0.2325)	-1.8753*** (0.2691)	-0.2165 (0.2338)
Constant	13.5144*** (0.5513)	-0.8929* (0.5016)	13.5420*** (0.5505)
Observations	17,723	17,723	17,723
R-squared	0.652	0.654	0.652
Firm FE	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

Step 1: We searched the websites of the Central People's Government and the Ministry of Industry and Information Technology to identify important national-level policy documents related to the digital economy. We extracted key terms associated with firm's digitalization by employing Python for word segmentation and manual identification. Ultimately, we selected a total of 197 firm digital-related vocabulary items with a frequency of five or more occurrences. These terms comprise the firm digital terminology dictionary used in this study.

TABLE 8 Digital vocabulary.

Dimensions						
Artificial intelligence	Big data	Cloud computing	Blockchain	Digital technology applications	Internet	Modern information systems

Step 2: We integrated the 197 terms from the firm digital terminology dictionary into the “jieba” Chinese word segmentation library within the Python software package. Subsequently, we utilized machine learning techniques to analyze the “Management’s Discussion and Analysis” (MD&A) section of the annual reports of listed firms. This analysis involved calculating the frequency of occurrence for each of the 197 terms related to firms’ digitalization within the annual reports (the selected digital vocabulary is presented in Table 8 and the whole list of 197 firm digital-related vocabulary items is presented in Table C1).

Step 3: Taking into account the variations in the length of the MD&A section across annual reports, we measured the micro-level corporate digitalization level (Digit) by dividing the total frequency of occurrence of firm digital-related vocabulary by the length of the MD&A section in each annual report. For ease of presentation, we multiplied this index by 100. A higher value of the Digit index indicates a higher level of firm digitalization.

Table 9 presents the estimation results of the multi-step model, demonstrating a partial mediation effect of firms’ digitalization (measured by the Digit variable) on the positive correlation between government subsidies and OFDI.

Our findings indicate that government subsidies can serve as a catalyst for firms to invest in innovation activities, thereby enhancing their competitiveness in the host country. On the one hand, firms may under-invest in innovation activities due to factors such as high risk, high input costs, financing constraints, and insufficient private returns (Hall & Lerner, 2010). Government subsidies can address such market imperfection (Bronzini & Piselli, 2016) by providing incentives to increase the scale and efficiency of innovation (Peters et al., 2012). On the other hand, Chinese firms engaged in OFDI often face challenges related to insufficient innovation capacity and weaker technological advantages compared to firms from developed countries when entering overseas markets (Peng et al., 2022; Wen & Zhao, 2021). To tackle these challenges that firms are facing, government subsidies can play a role in enhancing firms’ innovation capacity and competitiveness, and thus facilitating their OFDI.

6.4 | Social performance of firms

We focus on the environmental, social and governance (ESG) performance of Chinese listed firms and explore how government subsidies can aid in improving firms’ ESG performance. We utilize the Huazheng ESG rating index¹¹ to measure the ESG performance of Chinese listed firms. The Huazheng ESG rating index combines ESG reports, social responsibility reports, sustainable development reports, official website information, third-party data, as well as annual reports and other firm-released information. It takes into account both the mainstream ESG evaluation framework adopted abroad and the realities of China’s capital market and listed firms. Scholars commonly use this index in ESG research (Chang et al., 2023; Xie & Lv, 2022).

TABLE 9 Mediation effect: promoting digitalization.

Variables	(1) OFDI	(2) Digit	(3) OFDI
Subsidy	0.0825*** (0.0220)	0.0108*** (0.0020)	0.0808*** (0.0220)
Digit			0.1624** (0.0803)
Size	0.0421** (0.0188)	0.0065*** (0.0019)	0.0410** (0.0188)
Leverage	0.4407** (0.1987)	-0.0542*** (0.0203)	0.4495** (0.1987)
Cash	-0.1814 (0.3030)	-0.0366 (0.0292)	-0.1755 (0.3030)
Oversea	0.4548*** (0.1605)	-0.0079 (0.0131)	0.4561*** (0.1605)
Dual	0.0036 (0.0578)	-0.0026 (0.0065)	0.0040 (0.0577)
Independence	-0.2700 (0.5317)	-0.0924* (0.0490)	-0.2550 (0.5313)
State	0.2712 (0.2528)	0.0665*** (0.0208)	0.2604 (0.2529)
Management	-0.2745 (0.2325)	-0.0678** (0.0273)	-0.2635 (0.2325)
Constant	13.5144*** (0.5513)	-0.0078 (0.0540)	13.5157*** (0.5513)
Observations	17,723	17,723	17,723
R-squared	0.652	0.664	0.652
Firm FE	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

Table 10 shows that government subsidies have a positive effect on the ESG performance of listed firms, thereby further promoting OFDI. In addition, we examine the mediation effect of specific indicators for the environment (*E*), social (*S*), and governance (*G*), and find that government subsidies can enhance the social and governance performance of firms, and further encourage OFDI.

Our findings are consistent with the business reality in China. In recent years, there has been an increasing emphasis on the concepts of “sustainable” and “social” FDI in China, which align

TABLE 10 Mediation effect: promoting ESG performance.

Variables	(1) OFDI	(2) ESG	(3) OFDI	(4) E	(5) OFDI	(6) S	(7) OFDI	(8) G	(9) OFDI
Subsidy	0.0825*** (0.0220)	0.1179*** (0.0102)	0.0782*** (0.0222)	0.0793*** (0.0078)	0.0806*** (0.0221)	0.1334*** (0.0136)	0.0781*** (0.0221)	0.1210*** (0.0142)	0.0792*** (0.0222)
ESG			0.0365** (0.0184)						
E				0.0246 (0.0230)					
S							0.0332** (0.0138)		
G									0.0273** (0.0131)
Size	0.0421** (0.0188)	0.0933*** (0.0089)	0.0387** (0.0189)	0.0412** (0.0069)	0.0411** (0.0188)	0.1458*** (0.0118)	0.0373** (0.0189)	0.0748*** (0.0120)	0.0401** (0.0188)
Leverage	0.4407** (0.1987)	-0.7430*** (0.1008)	0.4678** (0.1993)	-0.1876*** (0.0684)	0.4453** (0.1990)	0.3729*** (0.1264)	0.4284** (0.1986)	-1.6997*** (0.1443)	0.4871** (0.2006)
Cash	-0.1814 (0.3030)	-1.2531*** (0.1631)	-0.1358 (0.3031)	-0.6552*** (0.1097)	-0.1653 (0.3033)	-0.8876*** (0.2018)	-0.1520 (0.3029)	-1.8955*** (0.2280)	-0.1297 (0.3029)
Overseas	0.4548*** (0.1605)	0.0916 (0.0698)	0.4515*** (0.1601)	-0.0067 (0.0498)	0.4550*** (0.1604)	-0.2999*** (0.0881)	0.4648*** (0.1605)	0.2551** (0.1004)	0.4479*** (0.1600)
Dual	0.0036 (0.0578)	-0.1196*** (0.0293)	0.0079 (0.0578)	-0.0762*** (0.0209)	0.0054 (0.0578)	-0.1830*** (0.0367)	0.0096 (0.0578)	-0.1204*** (0.0415)	0.0068 (0.0578)
Independence	-0.2700 (0.5317)	1.1676*** (0.2406)	-0.3126 (0.5328)	0.1909 (0.1710)	-0.2747 (0.5319)	0.3521 (0.3167)	-0.2817 (0.5317)	2.2392*** (0.3184)	-0.3311 (0.5335)

(Continues)

TABLE 10 (Continued)

Variables	(1) OFDI	(2) ESG	(3) OFDI	(4) E	(5) OFDI	(6) S	(7) OFDI	(8) G	(9) OFDI
State	0.2712 (0.2528)	-0.8308*** (0.1379)	0.3015 (0.2522)	-0.2651** (0.1180)	0.2778 (0.2524)	-0.3665** (0.1646)	0.2834 (0.2525)	-1.2666*** (0.1727)	0.3058 (0.2524)
Management	-0.2745 (0.2325)	0.3257** (0.1363)	-0.2864 (0.2321)	-0.2501*** (0.0814)	-0.2684 (0.2325)	-0.1536 (0.1545)	-0.2694 (0.2325)	0.7581*** (0.1968)	-0.2952 (0.2320)
Constant	13.5144*** (0.5513)	0.0715 (0.2675)	13.5118*** (0.5510)	-0.0623 (0.2041)	13.5159*** (0.5511)	-0.9669*** (0.3479)	13.5465*** (0.5512)	1.4023*** (0.3660)	13.4761*** (0.5507)
Observations	17,723	17,723	17,723	17,723	17,723	17,723	17,723	17,723	17,723
R-squared	0.652	0.571	0.652	0.758	0.652	0.668	0.652	0.471	0.652
Firm FE	YES								
Country FE	YES								
Year FE	YES								

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

with the formulation and achievement of the Sustainable Development Goals. The performance of firms in ESG aspects has drawn attention from Chinese government, businesses and the public. Incorporating ESG factors into investment decision-making has been increasingly advocated by both the Chinese government and multinational firms (Qiu & Yin, 2019). In April 2022, the China Securities Regulatory Commission (CSRC) issued the “Guidelines on Investor Relations Management for Listed Firms”,¹² which highlights the importance of firm’s ESG information disclosure as a key aspect of investor relations management. This policy shift underscores the growing importance of ESG practices in the Chinese business environment. Financial institutions are also giving attention to firm ESG ratings (Bromley & Powell, 2012; van Halderen et al., 2016).

More specifically, there are several rationales for correlating firm’s ESG performance with its OFDI activities. First, the prevalence of ESG in international investments has surged, underscoring sustainability as a consensus across economic, environmental, and social domains amid mounting societal concerns. Numerous studies reveal that investors and consumers are demonstrating a broad commitment to sustainability, channeling more funds into responsible firms for reasons extending beyond financial returns (Riedl & Smeets, 2017), and showing greater appreciation for the products of these firms (Albuquerque et al., 2019). Such focus on sustainability will increasingly reshape corporate objectives. Firms driven solely by profit maximization are at risk of operational difficulties if they underestimate the societal responsibilities engendered by sustainability demands. For multinational firms, sustainability expectations pose a more complex landscape compared to domestic firms (Buckley et al., 2017). On the one hand, many social issues inherently possess trans-boundary characteristics, and multinational firms may, under pressure from their home countries, relocate irresponsible business practices—such as the cross-border transfer of pollution—thus earning a reputation as “troublemakers,” exacerbating their legitimacy challenges in host countries. On the other hand, diverse expectations on social responsibility across host countries demand continuous adaptation by multinational firms to meet evolving stakeholder requirements within each locality (Husted & Allen, 2006). As sustainable development challenges intensify, multinational firms must increasingly pivot towards ESG considerations to foster specific competencies.

Second, ESG practices may address the legitimacy challenges in international investments within host countries, especially pivotal for emerging market firms. As suggested by Campbell et al. (2012), ESG serves as a foremost non-market tool to secure legitimacy in host countries. In the case of emerging market countries such as China, the relative underdevelopment of domestic market serves as a significant institutional driver for globalization (Witt & Lewin, 2007). This form of investment, labeled “institutional escape,” often positions these firms against heightened legitimacy challenges in host countries, due to doubts about their ability to discharge social responsibilities effectively (Marano et al., 2017). ESG competence inherently seals a firm’s legitimacy, dovetailing responsible investment values. Additionally, leveraging entrenched ESG principles rooted in environmental, social, and governance ethics help firms align better with the value systems of host countries, thereby reducing the pressure for institutional conformity.

Finally, an ESG-centric approach could confer a competitive edge on international investments in host countries (Xie & Lv, 2022). By adopting ESG principles, multinational firms stand to gain a competitive advantage in international business, transcending traditional profit-centric motives (McWilliams & Siegel, 2001). Through profound engagement with stakeholders, ESG practices bolster innovative eco-friendly endeavors, enhance supplier relationships, nurture intangible assets, and amplify reputational strengths. Ultimately, this amalgam of tangible and intangible returns from ESG practices augments a firm’s competitiveness in foreign markets (Flammer, 2015).

Moreover, we aim to examine the mediation effect of ESG performance by categorizing industries into socially responsible industries and other industries. We identify mining, food, and heavily polluting industries¹³ as socially responsible industries (Shen, 2007; Zhang, 2012). Our analysis, presented in column (2) and (5) of Table 11, highlights the profound impact of subsidies on firms operating in both socially responsible industries and other industries, leading to an increase in their social responsibility and improvement in their ESG scores (Chen et al., 2022).

However, our findings from columns (3) and (6) of Table 10 reveal that the mediation effect of ESG performance on OFDI is not significant for socially responsible industries. This finding can be attributed to the policy focus of the Chinese government. It is worth noting that many industries labeled as socially responsible industries are primarily heavily polluting industries. As a response, China has accelerated its transition towards a green development model. In recent years, China has intensified its efforts in pollution prevention and control, working diligently towards achieving the goals of peaking in carbon emissions and attaining carbon neutrality.¹⁴ Among these efforts, heavily polluting industries are strongly impacted by these policies. The government subsidies provided to firms can directly reduce the costs associated with environmental protection investments, thereby mitigating the outflow of funds resulting from environmental spending. This support helps firms recognize the economic and social benefits associated with fulfilling environmental responsibilities, while encouraging their voluntary involvement in environmental practices. Consequently, the effects of government subsidies are more noticeable in increasing firms' awareness of social responsibility rather than in OFDI.

7 | HETEROGENEITY ANALYSES

7.1 | Regressions by subsidy types

Subsidies in China are predominantly categorized into tax-based subsidies and non-tax-based subsidies (Zou & Adams, 2008). Tax-based subsidies are granted through prescribed tax policies and regulations, including tax rebates such as value-added tax, consumption tax, and export tax. Non-tax-based subsidies take various forms, such as direct cash payments, loan guarantees, and debt forgiveness (Li & Wu, 2022). Historically, Chinese local governments extensively provided tax incentives to support local firms. However, since 2007, most local tax-related subsidies, including preferential tax provisions, have been abolished, leading to a concentration of decision-making power regarding tax incentives in the Chinese central government. Consequently, local governments have turned to non-tax-based subsidies, such as direct financial support to firms (He, 2016; Lee et al., 2017).

Previous research argues that the effects of tax-based subsidies and non-tax-based subsidies differ from each other (He, 2016; Lee et al., 2014). Although closely related to our study, previous research mainly focuses on the effects of tax-based and non-tax-based subsidies on corporate investment efficiency (Hu et al., 2019). However, it does not fully investigate the effects of these two types of subsidies on OFDI. Therefore, our study aims to address this research gap.

To calculate the value of tax-based (non-tax-based) subsidies, we compile the amounts of tax (non-tax) subsidy projects from the CSMAR database. We then construct the Tax variable, which represents the natural logarithm of (1 + tax-based subsidy value), and the Non-tax variable, which represents the natural logarithm of (1 + non-tax-based subsidy value). Additionally, we calculate the ratio of tax-based (non-tax-based) subsidies to a firm's operating revenue, represented by the Tax1 variable and Non-tax1 variable, respectively, to consider the firm's size in the analysis.

TABLE 11 Socially responsible industries and other industries.

Variables	Socially responsible industries		Other industries			
	(1) OFDI	(2) ESG	(3) OFDI	(4) OFDI	(5) ESG	(6) OFDI
Subsidy	0.0594 (0.0364)	0.0901*** (0.0174)	0.0552 (0.0366)	0.0873*** (0.0268)	0.1316*** (0.0131)	0.0823*** (0.0271)
ESG			0.0470 (0.0326)			0.0383* (0.0220)
Size	0.0393 (0.0409)	0.1133*** (0.0174)	0.0340 (0.0409)	0.0495** (0.0203)	0.0891*** (0.0104)	0.0461** (0.0204)
Leverage	0.5470 (0.3887)	-0.3937** (0.2006)	0.5655 (0.3892)	0.4007* (0.2293)	-0.8741*** (0.1187)	0.4342* (0.2302)
Cash	-0.3692 (0.5728)	-1.4354*** (0.2988)	-0.3017 (0.5743)	-0.1358 (0.3489)	-1.1695*** (0.1944)	-0.0910 (0.3487)
Oversea	0.8778*** (0.3043)	-0.0271 (0.1367)	0.8791*** (0.3028)	0.3266* (0.1845)	0.0994 (0.0824)	0.3228* (0.1842)
Dual	0.0946 (0.0981)	-0.1259** (0.0537)	0.1006 (0.0981)	-0.0519 (0.0701)	-0.1105*** (0.0360)	-0.0476 (0.0701)
Independence	-0.7635 (0.9373)	2.6323*** (0.5110)	-0.8873 (0.9408)	-0.2630 (0.6277)	0.6537** (0.2724)	-0.2880 (0.6283)
State	-0.0293 (0.5382)	-0.7003*** (0.2409)	0.0036 (0.5327)	0.3457 (0.2876)	-0.9057*** (0.1698)	0.3804 (0.2880)
Management	-0.6768* (0.3883)	0.1855 (0.3168)	-0.6855* (0.3876)	-0.1368 (0.2753)	0.3785** (0.1517)	-0.1513 (0.2751)
Constant	14.2514*** (1.0269)	-0.5029 (0.5261)	14.2751*** (1.0246)	13.2247*** (0.6438)	0.1459 (0.3183)	13.2191*** (0.6435)
Observations	5395	5395	5395	12,308	12,308	12,308
R-squared	0.703	0.565	0.703	0.652	0.580	0.652
Firm FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

Table 12 illustrates the differential effects of non-tax-based subsidies and tax-based subsidies on OFDI by listed firms. It demonstrates that non-tax-based subsidies have a significant promoting effect on OFDI, while this finding does not hold for tax-based subsidies. One reason behind the significant promoting effect of non-tax-based subsidies on OFDI is that they often involve direct financial support or grants provided by the government to firms engaged in OFDI activities. These subsidies can alleviate financial constraints and confer a competitive advantage to firms seeking to expand internationally. By reducing financial barriers and providing support for specific initiatives, non-tax-based subsidies foster the growth and expansion of firms' international operations.

In comparison, although tax incentives can be beneficial to firms, their influence in promoting OFDI is not as pronounced as that of non-tax-based subsidies. This disparity could be attributed to several reasons. First, tax-based subsidies may offer less immediate and tangible financial support compared to non-tax-based subsidies. Firms tend to prioritize the direct financial resources provided by non-tax-based subsidies as they enable investments in critical aspects of international expansion, such as infrastructure, human resources, and technology. Second, tax-based subsidies are primarily governed by centralized rules and are subject to stringent criteria. In contrast, non-tax-based subsidies, which not only grant larger amounts of funding but are also primarily distributed by local governments, possess an inherently flexible nature that can be more easily leveraged by the government to incentivize firms to achieve government policy objectives including firm's internationalization.

7.2 | Regressions by OFDI entry modes

The choice of firms' OFDI entry modes has long been a topic of keen interest (Brouthers & Hennart, 2007; Nocke & Yeaple, 2007). Studies on the determinants of firms' OFDI entry modes has explored a range of factors including firm-specific heterogeneity (Cui & Jiang, 2010; Nocke & Yeaple, 2007); characteristics of the host country (Cui et al., 2011; Tao et al., 2013); and influences from the home country (Becker-Ritterspach et al., 2019; Luo & Wang, 2012; Sauvant et al., 2012; Sauvant & Chen, 2014). Notably, Sauvant and Chen (2014) and Becker-Ritterspach et al. (2019) detail the impact of home country measures, suggesting these home country measures can facilitate firms' willingness to invest abroad and shape the scope, location and mode of OFDI. Despite this, there is a notable gap in the literature regarding concrete empirical evidence on how home country subsidies influence firms' decisions on OFDI entry modes.

This study narrows its focus to the effect of government subsidies on greenfield investments and M&A, aiming to examine whether government subsidies influence firms' OFDI entry modes. Table 13 shows that the coefficients of the Subsidy variable for both types of entry mode are significantly positive. The results do not indicate a definitive preference for particular OFDI entry modes directly attributed to those subsidies. Essentially, it means that government subsidies do not appear to push Chinese listed firms towards choosing one approach of entering foreign markets over another.

7.3 | Regressions by firm characteristics

7.3.1 | State ownership

Different types of ownership are associated with distinct institutional arrangements. SOEs are important participants in the Chinese economy as providers of public goods and services, as well

TABLE 12 Tax-based subsidies and non-tax-based subsidies.

Variables	Tax		Non-tax	
	(1)	(2)	(3)	(4)
	OFDI	OFDI	OFDI	OFDI
Tax	0.0117 (0.0148)			
Non-tax			0.0667*** (0.0214)	
Tax1		0.0119 (0.0147)		
Non-tax1				0.0597*** (0.0205)
Size	0.0350 (0.0234)	0.0469* (0.0273)	0.0447** (0.0189)	0.1037*** (0.0258)
Leverage	0.3859 (0.2799)	0.3856 (0.2800)	0.4573** (0.2000)	0.4635** (0.2000)
Cash	-0.5520 (0.4220)	-0.5525 (0.4221)	-0.1818 (0.3039)	-0.1810 (0.3039)
Overseas	0.2745 (0.2392)	0.2745 (0.2392)	0.4442*** (0.1611)	0.4452*** (0.1611)
Dual	-0.0359 (0.0837)	-0.0357 (0.0837)	0.0023 (0.0579)	0.0024 (0.0579)
Independence	-0.0048 (0.7374)	-0.0059 (0.7371)	-0.2828 (0.5323)	-0.2937 (0.5322)
State	0.3763 (0.4750)	0.3755 (0.4749)	0.2941 (0.2542)	0.2871 (0.2541)
Management	-0.4888 (0.3645)	-0.4892 (0.3645)	-0.2744 (0.2327)	-0.2752 (0.2327)
Constant	15.0245*** (0.6190)	15.0227*** (0.6155)	13.7371*** (0.5445)	13.8737*** (0.5357)
Observations	10,824	10,824	17,691	17,691
R-squared	0.667	0.667	0.652	0.652
Firm FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

TABLE 13 Greenfield investment and M&A.

Variables	(1) Greenfield investment	(2) M&A
	OFDI	OFDI
Subsidy	0.0626*** (0.0237)	0.1258** (0.0544)
Size	0.0277 (0.0220)	0.0496 (0.0392)
Leverage	0.2696 (0.2130)	0.2852 (0.4281)
Cash	-0.2760 (0.3293)	0.3732 (0.7428)
Overseas	0.4620** (0.1810)	0.1409 (0.3563)
Dual	-0.0340 (0.0614)	0.1147 (0.1208)
Independence	-0.0829 (0.5850)	-0.7455 (1.0298)
State	0.3992 (0.2733)	-0.7530 (0.6750)
Management	-0.4527* (0.2700)	0.1008 (0.5724)
Constant	14.0198*** (0.6151)	13.3744*** (1.2054)
Observations	15,784	2209
R-squared	0.655	0.801
Firm FE	YES	YES
Country FE	YES	YES
Year FE	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

as implementers of social and development strategies. Being under government control, SOEs may exhibit different behavior in utilizing subsidies compared to non-SOEs. Therefore, we seek to examine whether government subsidies play different roles in promoting OFDI by SOEs and non-SOEs.

We differentiate between SOEs and non-SOEs based on their actual controlling entities. As shown in columns (1) and (2) of Table 14, our findings indicate that government subsidies significantly stimulate OFDI by non-SOEs. However, this finding does not hold for SOEs. As discussed in the Background section, the amount of subsidy received by non-SOEs have been consistently

TABLE 14 Heterogeneity analyses.

Variables	SOEs		Non-SOEs		Young firms		Established firms		Mature sectors		Emerging sectors		Catching-up sectors		Eastern region		Non-eastern region		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	
Subsidy	0.0432 (0.0433)	0.0786*** (0.0252)	-0.0106 (0.0500)	0.0901*** (0.0250)	0.1218 (0.0959)	0.0753** (0.0356)	0.0950** (0.0414)	0.0965*** (0.0239)	0.0726 (0.0541)										
Size	0.0113 (0.0305)	0.0685*** (0.0241)	0.0268 (0.0590)	0.0345* (0.0208)	0.1831*** (0.0674)	0.0733** (0.0334)	0.0677 (0.0446)	0.0435** (0.0193)	0.0272 (0.0564)										
Leverage	0.4894 (0.4525)	0.3696* (0.2243)	0.5847 (0.5078)	0.1590 (0.2372)	0.9705 (0.7993)	-0.0579 (0.3203)	0.8162* (0.4314)	0.5967*** (0.2039)	-0.3025 (0.6153)										
Cash	0.4081 (0.5606)	-0.4167 (0.3549)	-1.5187* (0.8632)	0.0984 (0.3237)	-0.7952 (1.1853)	-0.7450 (0.4750)	0.3458 (0.7393)	-0.2672 (0.3220)	-0.7117 (0.8073)										
Overseas	0.3523 (0.3170)	0.4497** (0.1749)	0.4283 (0.4487)	0.4515** (0.1835)	0.1540 (0.4948)	0.1985 (0.2208)	0.4025 (0.4003)	0.5054*** (0.1669)	0.0441 (0.5040)										
Dual	0.0375 (0.1118)	0.0307 (0.0663)	-0.1613 (0.2000)	0.0175 (0.0626)	-0.1384 (0.2631)	-0.0114 (0.0864)	-0.0538 (0.1433)	-0.0098 (0.0616)	0.0307 (0.1526)										
Independence	0.4807 (0.8546)	-0.5319 (0.6848)	-1.5816 (1.5200)	-0.2123 (0.5902)	-3.9965 (3.6966)	-0.5355 (0.7537)	0.3317 (1.1353)	-0.3728 (0.5906)	-0.5906 (1.1196)										
State	0.3397 (0.2234)	0.6464 (1.5163)	-0.1992 (0.5630)	0.4493 (0.3096)	-6.8985 (5.6530)	0.5136 (0.3855)	0.8569* (0.4606)	0.2724 (0.2447)	0.0804 (0.7328)										
Management	3.9037** (1.5413)	-0.1824 (0.2435)	-0.3990 (0.5773)	-0.1233 (0.3036)	-1.7537* (1.0633)	-0.1062 (0.3071)	0.5075 (0.5891)	-0.3304 (0.2405)	-0.6947 (0.8230)										
Constant	14.6403*** (1.0565)	13.1036*** (0.6610)	15.8006*** (1.5577)	13.6620*** (0.6156)	11.5706*** (2.2256)	13.1938*** (0.9064)	12.1587*** (1.2276)	13.2193*** (0.5977)	14.6552*** (1.3638)										

(Continues)

TABLE 14 (Continued)

Variables	SOEs	Non-SOEs	Young firms	Established firms	Mature sectors	Emerging sectors	Catching-up sectors	Eastern region	Non-eastern region
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI	OFDI
Observations	4611	13,073	3212	14,355	1004	7240	3365	14,618	3098
R-squared	0.745	0.640	0.676	0.673	0.735	0.664	0.675	0.663	0.682
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: The data in brackets are robust standard errors. ***, **, and * represent passing significance tests at the levels of 1%, 5%, and 10%, respectively.

increasing and has even surpassed that received by SOEs in recent years. The empirical analysis further confirms that, compared to SOEs, subsidies have a significant positive effect on incentivizing OFDI by non-SOEs. There might be two reasons for this finding. First, SOEs may prioritize non-commercial goals and social and political responsibilities over profit maximization, and subsidies can serve to compensate for these non-commercial burdens (Bai et al., 2006; O'Connor et al., 2006; See, 2009) rather than direct internationalization strategy. Second, for non-SOEs that are facing fiercer competition in the Chinese domestic market compared with SOEs, the exploration of overseas market might be more appealing. In comparison, research on Chinese listed manufacturing SOEs suggests that state ownership fosters dependence of SOEs on their home governments, which could undermine the willingness of SOEs to engage in OFDI (Huang et al., 2017).

7.3.2 | Firm age

We seek to investigate the potential effect of government subsidies on OFDI with consideration to the firm's life-cycle stage (Xie, 2022). Building upon previous research conducted by Zahra et al. (2000) and Wu and Zhang (2021), we utilize the criterion of firm age to classify firms into two categories: young firms and established firms. Young firms are defined as those with an age of 12 years or less, whereas established firms are those that have been in operation for more than 12 years. As shown in columns (3) and (4) of Table 14, we find that government subsidies have a positive effect on OFDI by established firms, while this positive effect is not statistically significant for young firms.

It is observed that young firms have a lower likelihood of engaging in international expansion due to their limited operational capabilities and market positions (Vahlne & Johanson, 2017). These firms primarily focus on enhancing their domestic capabilities and market power. On the contrary, established firms are more likely to engage in OFDI with government support due to their past experiences, resource advantages and dominant positions in the home market (Hong et al., 2015). Additionally, established firms are more capable to deal with uncertainties and risks in overseas markets (Danneels, 2008).

7.3.3 | Industrial sectors

In Section 3, we have classified China's industrial sectors into three categories based on their relative stage of development compared to the world's technological frontier. The three categories include the domestically mature sectors, characterized by a low technological entry barrier and slow technological progress, the globally emerging sectors, which experiences rapid technological advancement with huge uncertainties, and the domestically catching-up sectors, which still has significant room for technological improvement. In the globally emerging and domestically catching-up sectors, there exists a stronger motivation for technology-seeking OFDI. The primary goal of this type of OFDI is to acquire technical information, intellectual capital, and research equipment from the host country, as well as to strengthen the firm's technological competitiveness.

As shown in the column (5)–(7) of Table 14, we find that the coefficient of the Subsidy variable is significantly positive for both the globally emerging sectors and the domestically catching-up sectors. However, it is not statistically significant for the domestically mature sectors.

This suggests that government subsidies targeting the domestically mature sectors have lesser effect on OFDI than those targeting the other sectors.

The Chinese government has given priority to both the globally emerging sectors and the domestically catching-up sectors. While Chinese firms initially invested predominantly in energy and primary resources, which have limited technological advancement, recent trends show a preference for high-tech industries with more technological advancement (Wang & Miao, 2016). This shift can partly be attributed to government policies. Our results indicate that with increased policy attention and support, the globally emerging sectors and the domestically catching-up sectors can engage more effectively in technology-seeking OFDI.

7.3.4 | Geographical regions

China, as a vast country, exhibits distinct variations in capital, technology, resources, and institutional environment among its different regions. Given China's significant size and geographical diversity, various regions have played diverse roles in promoting the country's economic development. Notably, the eastern region of China has consistently maintained a leading position in terms of economic development and modernization. To delineate our analysis, we draw a distinction between firms based on the location of their headquarters, classifying them into the eastern region group, which comprises Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan, and the non-eastern region group.

As shown in columns (8) and (9) of Table 14, we observe that the coefficient of the Subsidy variable is significantly positive for the eastern region group, while it is not statistically significant for the non-eastern region group. These results indicate that government subsidies have a stronger positive effect on the OFDI by firms located in eastern China.

As we mentioned in the Background section, the total amount of subsidies received by listed firms in the eastern region of China is significantly higher than that in the non-eastern region. Empirical research also demonstrates that government subsidies effectively promote OFDI by firms in the eastern region. This can be attributed to the more advanced governance capacity in eastern China, where the market plays a decisive role in the business environment and the government is more capable of dealing with market imperfections. In such an environment, local governments may allocate subsidies in a more market-mechanism oriented manner, and minimize non-market effects associated with subsidies.

8 | CONCLUSIONS

The Chinese government's "go global" policy aims to improve the performance of Chinese firms. In this article, we focus on estimating the effects of Chinese government subsidies on the OFDI by Chinese listed firms. The results demonstrate that government subsidies can promote OFDI through enhancing the production efficiency, innovation capability, and social performance of Chinese listed firms. Further analyses indicate that such a positive effect of government subsidies on OFDI may vary depending on the types of subsidies and the characteristics of firms. The non-tax-based subsidies play a more significant role in promoting OFDI by listed firms. In addition, non-SOEs, older firms, firms in the globally emerging sectors and the domestically catching-up sectors, and firms located in eastern China can derive greater benefits from government subsidies when engaging OFDI.

Our study holds important policy implications. By focusing on China as an empirical setting, our study aims to enhance understanding of the role of an emerging economy government in promoting OFDI. Overall, China has achieved success in both inward and outward FDI activities, thanks in part to effective government policies and measures that help firms deal with market imperfections and overcome competitive disadvantages as “late comers” in the global market. From a policy-making perspective, government subsidies are justified in internationalization strategies for two reasons. First, as OFDI represents a higher commitment, less liquidity, and greater risk compared to domestic operations, government subsidies serve the purpose of mitigating the increased risk associated with internationalization. Second, our findings indicate that government subsidies can generally serve as a tool to promote internationalization through enhancing firms’ capabilities. The performance-based view suggests that encouraging firms with better production efficiency, innovation capability, and social performance to engage in OFDI can not only benefit the firms themselves, but also contribute to the economic development of host countries.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ENDNOTES

- ¹ We do not include special treatment (ST) firms that have abnormal operating conditions in our sample.
- ² We calculate the level of government subsidies as the total amount of government subsidies divided by the operating revenue of listed firms.
- ³ We distinguish SOEs from non-SOEs based on their actual controllers.
- ⁴ On May 8, 2015, the Chinese State Council launched “Made in China 2025” initiative, which is a state-led industrial policy initiative that aims to enhance China’s innovation capacity and manufacturing competitiveness in high-tech and advanced manufacturing industries. Please refer to “Made in China 2025” plan issued by The State Council of the People’s Republic of China, available at: http://english.www.gov.cn/policies/latest_releases/2015/05/19/content_281475110703534.htm.

- ⁵ We divide our sample into two categories: firms operating in strategic sectors targeted by the “Made in China 2025” initiative and other non-strategic sectors. Our aim is to analyze the focus of government subsidies in these sectors. The “Made in China 2025” initiative primarily focuses on 10 strategic sectors, namely new information technology, high-end numerically controlled machine tools and robots, aerospace equipment, ocean engineering equipment and high-end vessels, high-end rail transportation equipment, energy-saving cars and new energy cars, electrical equipment, farming machines, new materials such as polymers, bio-medicine, and high-end medical equipment. To accurately determine which sectors fall under the strategic categories, we referred to the industry codes provided in the “Guidelines on Industry Classification of Listed Companies (2012)” issued by the China Securities Regulatory Commission (CSRC). Specifically, we matched these 10 strategic sectors with the industry codes C25-C29, C33-C41, and I63-I65 outlined in the CSRC guidelines.
- ⁶ According to the research conducted by Mao et al. (2021), the domestically mature sector refers to industries where both China and the world frontier have achieved technological maturity. The globally emerging sector includes industries where China and the world frontier are in the early stages of technological development. The domestically catching-up sector comprises industries where China has made significant technological improvements but still lags behind the world frontier. To classify the sectors accurately, we matched the sector classification with the corresponding industry codes provided by the CSRC. The domestically mature sector includes CSRC codes B08-B09, C17-C21, and H61-H62. The globally emerging sector includes CSRC codes C26-C29, C34, C39, and I63-I65. The domestically catching-up sector includes CSRC codes C35, C38, D44, G53-G56, and G58-G60.
- ⁷ According to the “New Tax Haven Blacklist” released by the European Union in 2019, a total of 15 countries and regions have been identified as tax havens. These include Dominica, American Samoa, Aruba, Barbados, Belize, Bermuda, Fiji, Guam, Marshall Islands, Oman, Samoa, Trinidad and Tobago, US Virgin Islands, United Arab Emirates, and Vanuatu. In addition, there are three internationally recognized tax havens, namely British Virgin Islands, Cayman Islands, and Luxembourg.
- ⁸ The industry classification is according to the “Guidelines on Industry Classification of Listed Companies (2012)” issued by CSRC, available at: <http://www.csrc.gov.cn/csrc/c101864/c1024632/content.shtml>.
- ⁹ The Report of 19th National Congress of the Communist Party of China, available at: https://www.gov.cn/zhuanti/2017-10/27/content_5234876.htm.
- ¹⁰ MOFCOM. Guidelines for Foreign Investment Cooperation in Digital Economy, available at: <http://images.mofcom.gov.cn/hzs/202107/20210723142119100.pdf>.
- ¹¹ The Huazheng ESG rating index comprises nine grades, ranging from low to high: C, CC, CCC, B, BB, BBB, A, AA, AAA. To construct the ESG variable, we utilize a value assignment method based on the nine grades. Each grade from C to AAA is assigned a value from 1 to 9 in ascending order. For example, a rating of C corresponds to an ESG variable value of 1, a rating of CC corresponds to an ESG variable value of 2, and a rating of CCC corresponds to an ESG variable value of 3. The Huazheng ESG rating index is updated and published quarterly. To obtain an annual rating score, we calculate the average rating across four quarters. This approach enables us to capture the overall ESG performance of firms on a yearly basis.
- ¹² China Securities Regulatory Commission (CSRC). Guidelines on Investor Relations Management for Listed Firms (2022), available at: https://www.gov.cn/zhengce/zhengceku/2022-04/16/content_5685513.htm?eqid=fd06eedb00208d380000000464647add.
- ¹³ Heavily polluting industries include sectors such as metallurgy, chemical industry, petrochemicals, coal, thermal power, building materials, paper-making, brewing, pharmaceuticals, fermentation, textiles, leather production, and mining.
- ¹⁴ For details, please refer to the report of the 20th National Congress of the Communist Party of China: https://www.fmprc.gov.cn/eng/zxxx_662805/202210/t20221025_10791908.html.

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APPENDIX A

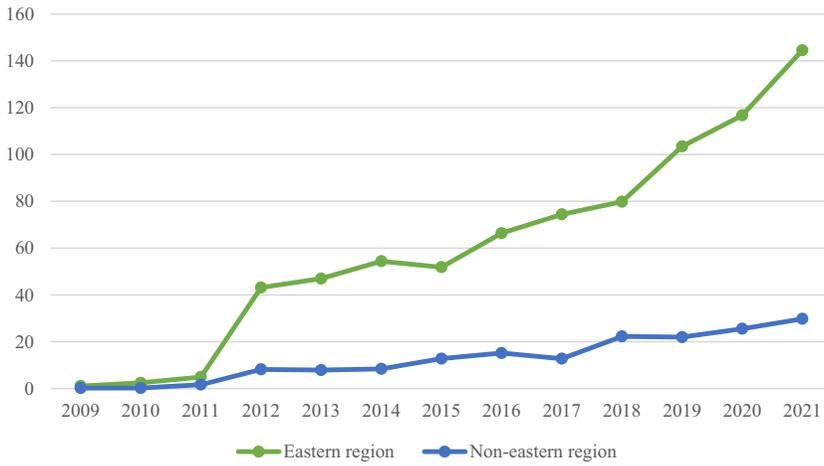


FIGURE A1 Amount of government subsidies by regions (billion RMB). [Colour figure can be viewed at wileyonlinelibrary.com]

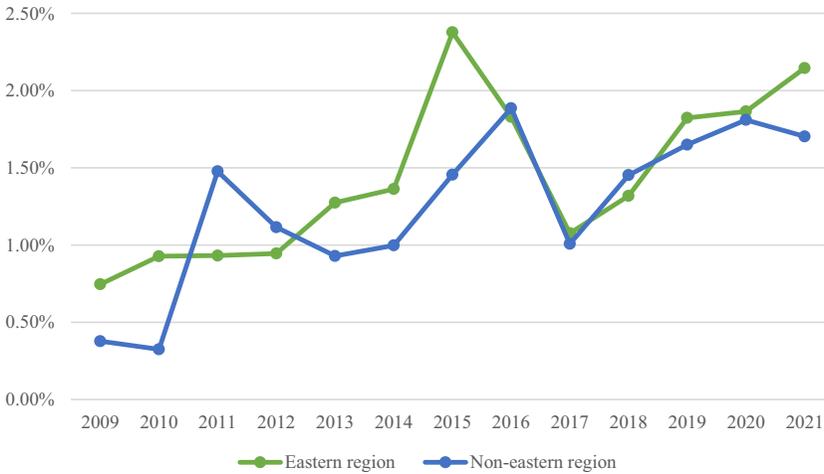


FIGURE A2 Level of government subsidies by regions (%). [Colour figure can be viewed at wileyonlinelibrary.com]

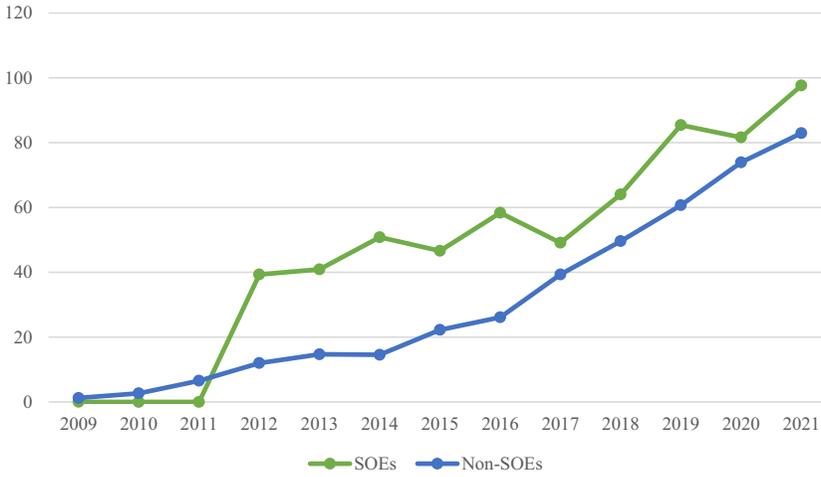


FIGURE A3 Amount of government subsidies by ownership (billion RMB). [Colour figure can be viewed at wileyonlinelibrary.com]

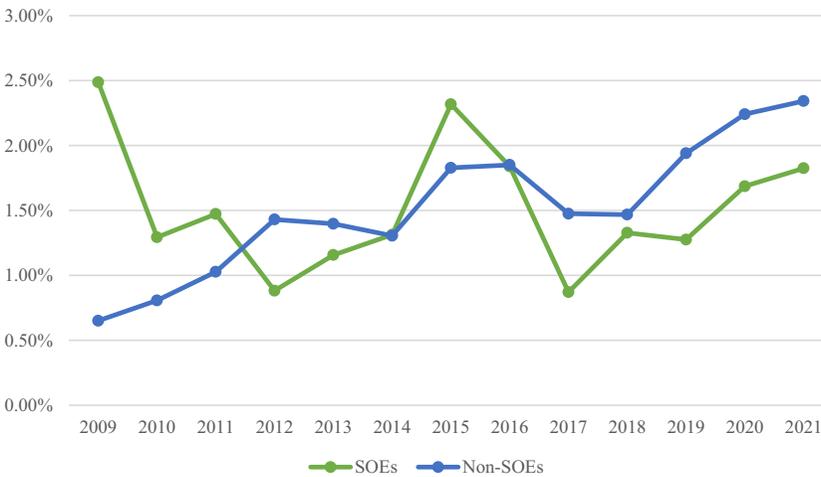


FIGURE A4 Level of government subsidies by ownership (%). [Colour figure can be viewed at wileyonlinelibrary.com]

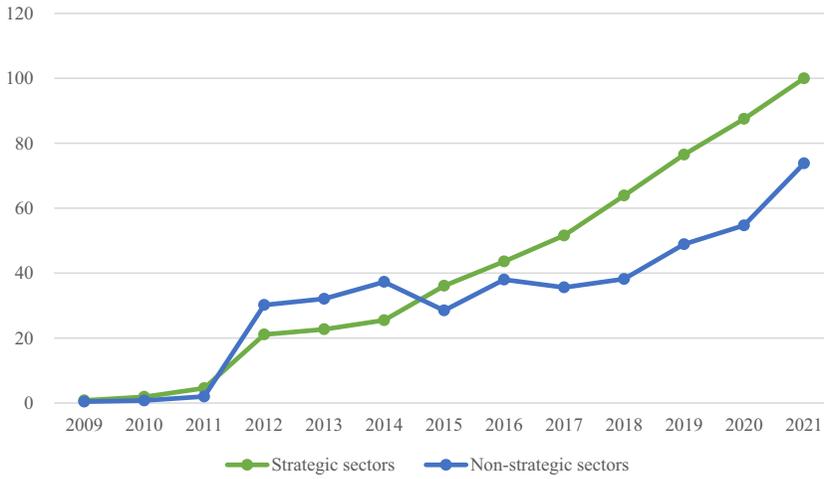


FIGURE A5 Amount of government subsidies by strategic and non-strategic sectors (RMB billion). [Colour figure can be viewed at wileyonlinelibrary.com]

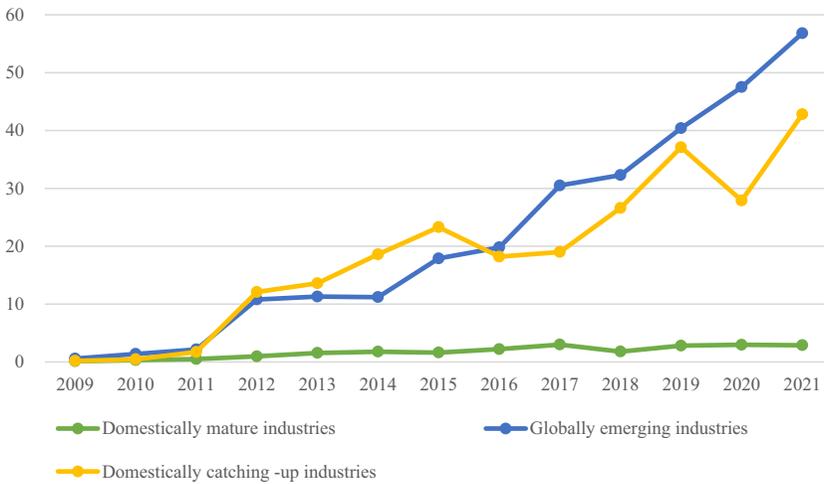


FIGURE A6 Amount of government subsidies by sectors in different technology stages (RMB billion). [Colour figure can be viewed at wileyonlinelibrary.com]

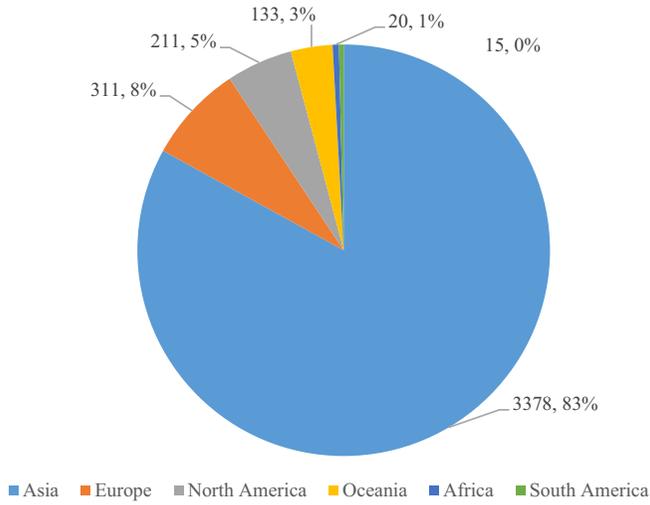


FIGURE A7 The regional distribution of OFDI by Chinese listed firms. [Colour figure can be viewed at wileyonlinelibrary.com]

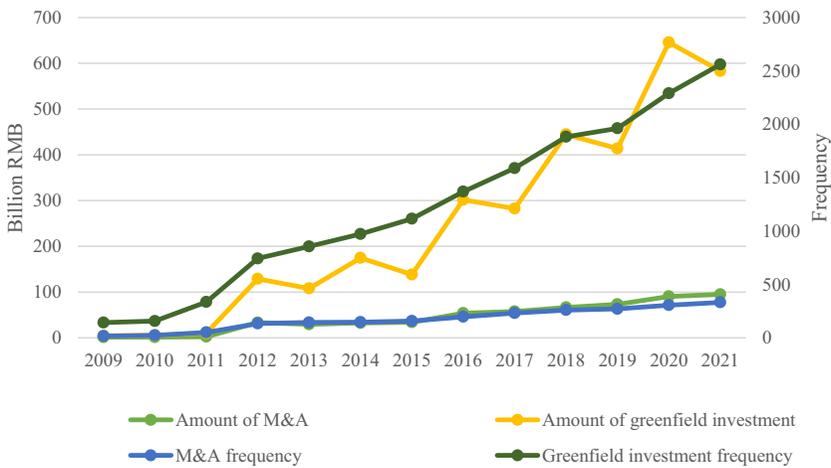


FIGURE A8 The entry modes of OFDI by Chinese listed firms. [Colour figure can be viewed at wileyonlinelibrary.com]

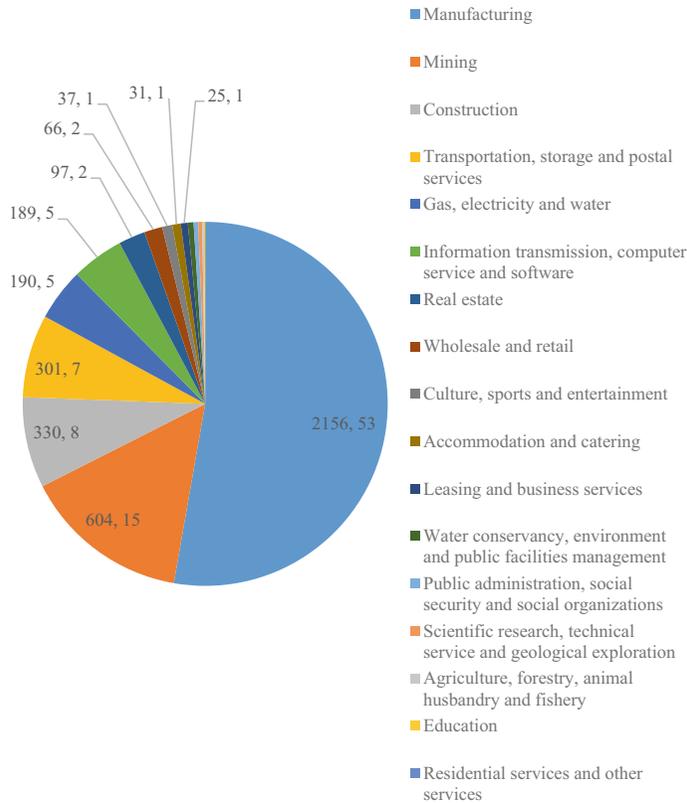


FIGURE A9 The sector distribution of OFDI by listed firms during 2009–2021. For each segment of the pie chart, the first value is expressed in billions of RMB, and the second value is expressed as a percentage. [Colour figure can be viewed at wileyonlinelibrary.com]

APPENDIX B

TABLE B1 Summary statistics for main variables.

	Observations	Mean	Standard deviation	Minimum	Maximum
OFDI	17,934	15.970	2.963	6.351	21.970
Subsidy	17,934	17.070	1.583	12.960	21.230
Size	17,934	21.100	1.718	15.190	25.270
Leverage	17,934	0.438	0.193	0.066	0.872
Cash	17,934	0.052	0.065	−0.134	0.238
Overseas	17,934	0.262	0.266	0	0.961
Dual	17,934	0.317	0.465	0	1
Independence	17,934	0.378	0.055	0.333	0.571
State	17,934	0.020	0.080	0	0.583
Management	17,934	0.158	0.206	0	0.716

APPENDIX C

TABLE C1 197 firm digital-related vocabulary items.

5G	High-efficiency computing	Natural language processing (NLP)
Adaptive recognition	High-end intelligence	Networked
Artificial intelligence (AI)	Historical behavioral data prediction	Networked collaboration
Automatic control	Human-computer interaction	Neural networks
Automatic identification	Identity authentication	NFC payment
Automatic monitoring	Image analysis	Numerical control (NC)
Automatic production	Image recognition	Online and offline
Autonomous driving	Industrial communication artificial intelligence	Online-to-offline (O2O)
Autonomous perception	Industrial digitalization	Open banking
Bayesian	Industrial information	Open banking data management
Big data	Industrial intelligence	Platform mode
Biometric technology	Industrial internet	Probabilistic topic model
Bitcoin	Information center	Production manufacturing execution system
Blockchain	Information integration	Quantitative finance
Brain-like computing	Information management	Quantum communication
Brain-machine integration	Information network	Quantum computing
Business intelligence	Information physical system	Radio frequency identification (RFID)
Business-to-business (B2B)	Information sharing	Random forest
Business-to-consumer (B2C)	Information system	Reinforcement learning
Chief data officer (CDO)	Information terminal	Remote collaboration
Cloud computing	Infrared sensor	Reverse customization
Cloud ecology	In-memory computing	Robo-advisors
Cloud platform	Integrated system	Robotics
Cloud services	Integration	Satellite internet
Cloud storage	Intelligent data analysis	Semantic analysis
Cloud system	Intelligent environmental protection	Semantic search
Cognitive computing	Intelligent management	Sentiment analysis
Communication technology	Intelligent medical	Smart agriculture
Consensus mechanism	Intelligent networked	Smart algorithms
Consumer-to-business (C2B)	Intelligent prediction	Smart city
Consumer-to-consumer (C2C)	Intelligent recognition	Smart contracts

(Continues)

TABLE C1 (Continued)

5G	High-efficiency computing	Natural language processing (NLP)
Control tower	Intelligent robots	Smart control
Converged architecture	Intelligent supply chain	Smart customer service
Data center	Intelligent systems	Smart devices
Data mining	Intelligent tourism	Smart energy
Data network	Intelligent transportation	Smart factory
Data platform	Intelligent unmanned system	Smart grid
Data science	Internet applications	Smart home
Data visualization	Internet business	Smart logistics
Decision support system	Internet ecology	Smart manufacturing
Decision tree	Internet finance	Smart marketing
Deep learning	Internet marketing	Smart organization
Digital capability	Internet medical	Smart production
Digital communication	Internet mobile	Smart sensing
Digital currency	Internet mode	Smart supply chain
Digital finance	Internet of Things (IoT)	Smart technology
Digital management	Internet platform	Smart terminals
Digital marketing	Internet plus	Smart warehousing
Digital network	Internet strategy	Smart wearables
Digital office	Internet technology	Speech recognition
Digital platform	Internet thinking	Stream computing
Digital supply chain	Investment decision support system	Supply chain digitalization
Digital technology	IPv6	Support vector machine (SVM)
Digital terminal	Knowledge mining	Text mining
Distributed computing	Laser scanner	Text recognition
E-commerce	License plate recognition	Third-party payments
Ecosystem	Lifecycle management	Unmanned delivery
Emotion recognition	Machine learning	Unmanned retail
Enterprise platformization	Massive data	Unmanned warehouse
Facial recognition	Mining algorithm	Virtual manufacturing
Financial technology (Fintech)	Mixed reality	Virtual reality
Fingerprint recognition	Mobile intelligence	Virtualization
Future factory	Mobile internet	Visual analysis
Genetic algorithm	Mobile payment	Voice control
Gesture recognition	Motion recognition	Voice interaction
Global positioning system (GPS)	Multi-party secure computing	